

The Office asserts that the claims are indefinite because the range percentages claimed in independent claim 1 and 33 do not add up to one hundred percent (100%) and a maximum percentage by weight of both the mat and the resin must be used to have a composite equaling 100%.

The Applicants respectfully submit that the claims, as previously presented and as currently presented, particularly point out and distinctly claim the invention. The Applicants note that the claims utilize the transitional phrase "comprising" and are therefore inclusive or open ended. The transitional phrase "comprising" is synonymous with "including," "containing," or "characterized by," and does not exclude additional, unrecited elements. Claims using the transitional phrase "comprising" are open to the inclusion of unspecified ingredients even in major amounts. M.P.E.P. 2111.03. Accordingly, the Office's presentation of a hypothetical composite and question of whether additional components (i.e., elements) are claimed is both unnecessary and improper.

The Applicant respectfully submits that previously presented independent claims 1 and 33 recite the invention with the required precision. While the language of those claims is limited to recitation of the minimum elements deemed necessary to the patentability of the invention, the recited claims are not precluded from including additional elements. Thus, the Applicants respectfully submit that previously presented claims 1 and 33 are definite and request withdrawal of this rejection of the claims.

Further, with respect to the previously presented claims, the Applicants note the disclosure and additional recitation of dependent claims in which the friction material is not formed solely of a mat of non-woven fibres and a thermosetting resin. Specification at pages 7-8. The friction material may also include fillers in powder and/or pulp form. The fillers include copper, rockwool, carbon, zirconium silicate, iron sulphide, alumina, rubber, diatoms, and pulps of glass, aramid, acrylic and phenolic fibres.

The previously presented dependent claims recite that these fillers are incorporated into the mat or incorporated into the thermosetting resin in order to provide linkage of the claimed elements of the friction material. Such language conveys, consistent with the plain meaning of the term "incorporated," that the fillers are 'blended or combined thoroughly with' the mat or the thermosetting resin. See M.P.E.P. 2111.03 and WEBSTER'S COLLEGIATE DICTIONARY

(Mish ed., 9th ed. 1988). Thus, the application (specification and claims) provides disclosure of additional elements that comprise the claimed friction material.

Nevertheless, the Applicants have voluntarily amended dependent claims 4, 6, 11, 25, and 37 to recite inclusion of fillers in the composition of the friction material and thus make the above-explained relation and the claims more explicit. The dependent claims now recite that the "friction material ... further including fillers ... ."

Dependent claims 2-7, 9-11, 25, 28, and 34-39 were rejected based on their dependency upon an allegedly indefinite claim. The Applicants respectfully request withdrawal of these rejections because, as explained above, the respective base claims, as previously presented and as currently presented, are believed to be definite.

#### **Rejections Under 35 U.S.C. § 103(a) over Bortz**

Claims 1-7, 9-11, 25, 28, and 33-39 were rejected under 35 U.S.C. § 102(b) as being unpatentable over Bortz (US 5,646,076). The Office asserts that Bortz teaches a friction controlling device made of a fiber reinforced polymer composite material produced by a nonwoven textile and a plastics industries material, including fibers in a 0.3cm – 8.0cm range, preferably aramid and glass fibers, a polymeric resin binder or blend of resin solutions impregnated in the product, the polymer including phenols, and additionally including fillers such as powders (graphite) or additional fibers.

The Office further asserts that Bortz shows many different percentage ranges in terms of the fiber and resin contents and, while Bortz does not teach the claimed ranges in a single example, modifying the content percentages of Bortz would be undertaken keeping in mind and motivated by the end use of the friction material so constructed. The Office thus asserts that modifying the content percentages to an optimum range, characterized by the Office as discovering an optimum or workable value of a result effective variable, involves only routine skill and renders the invention obvious.

First, as the Office acknowledges, Bortz, while teaching various examples of friction materials that utilize many different fiber and resin content percentage ranges, fails to teach the friction material claimed by the present invention. In contrast, the Applicants' claimed invention provides a friction material comprised of specific content percentage ranges, with a claimed

relationship between the percentage of the mat of non-woven fibers and the percentage of thermosetting resin in the resultant friction material. This resultant friction material has increased strength and durability over prior art paper type friction materials.

Second, the various examples of friction materials taught by Bortz fail to disclose or suggest modification of the content percent of the mat of non-woven fibers versus the content percent of the thermosetting resin to provide a resultant friction material with increased strength and durability. While teaching various embodiments of friction materials different than the friction material claimed by the Applicant, Bortz merely states that differences in coefficients of friction can be effected by a change in the fiber, polymer matrix, or construction of a composite material. Bortz column 1, line 55-60.

Bortz fails to teach variation of the content percent of the mat of non-woven fibers and the thermosetting resin, as disclosed by the Applicants, which variation results in the claimed friction material having improved characteristics. Bortz does not teach or suggest the content percentages of non-woven mat and thermosetting resin are result effective variables that should be worked to an optimum range to provide the friction material of the Applicants' claimed invention. Simply, Bortz fails to disclose or suggest variation of the parameters taught by the Applicant. Bortz merely discloses various material used in friction material compositions. In other words, Bortz creates a different end product adapted to a particularly desired end use by varying parameter different than those taught by the Applicant. In contrast, the friction material of the Applicants' claims provides specific content percentage ranges that can be varied that result in a friction material having increased strength and durability over the prior art

Third, differences in properties cannot be disregarded on the ground they are differences in degree rather than in kind. Claim 1 recites a friction material comprising approximately 20% to 40% by weight a mat of non-woven fibers and approximately 40% to 60% by weight a thermosetting resin which impregnates the fibers. The claimed friction material recites with specificity the proportion of non-woven fibers and thermosetting resin. In contrast, Bortz fails to provide or suggest such teaching as Bortz leaves unstated the composition of the exemplary friction material beyond stating a singular percentage for the mat or the resin of the exemplary friction material. Bortz fails to teach or suggest the claimed relation between the total weight of the non-woven fiber mat and the total weight of the impregnating thermosetting resin in terms of

the total weight of the friction material. The claimed invention, on the other hand, provides teaching of both the percentage of a non-woven mat and the percentage of a thermosetting resin of which results in a friction material that displays a remarkable stability while having a coefficient of friction very close to that of prior art paper-type friction materials.

Accordingly, the Applicants submit that the teaching of Bortz does not render the claim 1 obvious. For the above stated reasons, amended Claim 1 is believed to distinguish patentably from Bortz. Accordingly, reconsideration and withdrawal of the rejection of claim 1 under Section 102 is respectfully requested.

As Claims 2-7, 9-11, 25, and 28 directly and indirectly depend from Claim 1, each of these claims is believed to be allowable over the prior art based on that dependency and the reasons stated above. In addition, each of these claims is believed patentable based on the additional novel matter contained therein. Accordingly, reconsideration and withdrawal of the rejection of Claims 2-7, 9-11, 25, and 28 is respectfully requested.

**Rejections Under 35 U.S.C. § 103(a) over Bortz in view of Suzuki**

Claims 6, 7, and 25 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Bortz (US 5,646,076) in further view of Suzuki (US 5,823,314).

The Applicants previously submitted that Suzuki does not qualify as prior art under 35 U.S.C. § 102 and thus, should be removed as a basis for rejection of the claims. The Applicants noted that the official filing receipt for the present application shows a priority to French Patent Application 94 03518 and a priority date of March 25, 1994. Thus, Suzuki is an intervening reference between the United States filing date (March 11, 1998) and the priority date (March 25, 1994) of the present application.

The Office directs that the Applicants must submit an official translation to overcome the date issue, Suzuki being a continuation of an application first filed December 15, 1994.

The Applicants respectfully submit that the requested official translation has already been submitted to the Office and respectfully request that Suzuki be removed as a reference, obviating the rejection of claims 6, 7, and 25.

The filing of this continuation application included a translation into English of the

specification and a statement that the translation of the international application is accurate. Attached herewith is a copy of the declaration of the translator of the application, provided with the filing of the continuation application on March 11, 1998.

Also attached herewith is copy of the filing receipt from the parent application of this continuation application, dated March 4, 1996. That filing receipt indicates that the Office, in its capacity as a designated office, received from the international authority all of the items required under 35 U.S.C. 371 for commencement of the national stage of an international application designating the United States. Specifically, the filing receipt indicates that the Office received directly from the international authority (i.e., PCT), a copy of the international application in a non-English language and a translation of the application into English. Thus, the Office accepted the application for national patentability examination.

Accordingly, the Applicants submit that the requested translation has already been provided and that Suzuki should be removed as a prior art reference. Since Suzuki is not prior art to this application, Suzuki can not be a basis for rejection of the claims of the application. With Suzuki removed, the Applicants respectfully submit that claims 6, 7, and 25 are distinguishable from the Bortz reference, as inherently acknowledged by the Office with this rejection.

Concerning the rejection of claims, as discussed above, Bortz does not teach or suggest the Applicants' claimed invention, which recites a specific relation between the weight of the non-woven fibre mat and the weight of impregnating thermosetting resin comprising a friction material. As acknowledged by the Office, the Bortz does not disclose Applicants' claim 1. The Applicants further submit that the cited reference does not suggest Applicants' claim 1 and thus, claim 1 is patentable over the cited reference. Rejected claims 6, 7, and 25 depend indirectly from independent claim 1, and thus include all the limitations of that base claim. Accordingly, the Applicants submit that claims 6, 7, and 25 are patentable over the Bortz patent for the reasons stated above with respect to claim 1 and request withdrawal of the rejection of claims 6, 7, and 25. Additionally, claims 6, 7, and 25 recite the inclusion of fibers in the form of pulps in the claimed friction material. Bortz fails to disclose or suggest inclusion of this type of material in friction material it teaches. For this reason, the Applicants respectfully submit that claims 6, 7, and 25 are patentable over the Bortz reference.

**Conclusion**

Based on the foregoing remarks, it is respectfully submitted that all the claims as currently pending are patentable and in condition for allowance. Reconsideration of the application and withdrawal of the rejections are respectfully requested.

In the event that a telephone conference would facilitate examination in any way, the Examiner is invited to contact the undersigned representative at the number provided.

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Respectfully submitted,



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**CLAIMS MARKED TO SHOW CHANGES MADE**

1. A friction material designed for fitting to a device employing friction in a liquid medium, the friction material comprising  
approximately 20% to 40% by weight a mat of non-woven fibres and  
approximately 40% to 60% by weight a thermosetting resin which impregnates  
said fibres, wherein said fibres have a length of at least 12 mm.
2. A friction material according to Claim 1, wherein the average length of the fibres is at most 120 mm.
3. A friction material according to Claim 2, wherein the fibres are chosen from the group consisting of glass, wool, cotton, ceramic, polyacrylonitrile, preoxidized polyacrylonitrile and aramid.
4. (Two Times Amended) A friction material according to Claim 3 [, wherein] further including  
fillers in powder form [are] incorporated into the mat.
5. A friction material according to Claim 4, wherein said fillers in powder form are selected from the group consisting of copper, rockwool, carbon, zirconium silicate, iron sulphide, alumina, rubber and diatoms.
6. (Two Times Amended) A friction material according to Claim 4 [, wherein] further including  
fillers in the form of pulps [are] incorporated into the mat.
7. (Two Times Amended) A friction material according to Claim 6, wherein said [pulp] fillers  
in pulp form are selected from the group consisting of the pulps of glass, aramid, acrylic and phenolic fibres.
9. A friction material according to Claim 1, wherein the thermosetting resin is resol-based.

10. A friction material according to Claim 1, wherein latex is added to the thermosetting resin.
11. (Four Times Amended) A friction material according to Claim 1 [, wherein] further including fillers in powder form [are] incorporated into the thermosetting resin, wherein said fillers in powder form are selected from the group consisting of copper, rockwool, carbon, zirconium silicate, iron sulphide, alumina, rubber and diatoms.
25. (Amended) A friction material according to Claim 5[, wherein] further including fillers in the form of pulps [are] incorporated into the mat.
28. (Two Times Amended) A friction material according to Claim 1, wherein the thermosetting resin includes a polar solvent, the polar solvent [is] being an aqueous polar solvent.
33. A friction material for a device employing friction in a liquid medium, the friction material comprising a mat of non-woven fibres impregnated with a thermosetting resin, wherein the friction material comprises by weight  
approximately 20% to 40% fibres selected from the group consisting of glass, wool, cotton, ceramic, polyacrylonitrile, preoxidized polyacrylonitrile and aramid; and  
approximately 40% to 60% thermosetting resin selected from the group consisting of water-based resins, resol-based resins, phenolic plastic resins, aminoaldehyde resins, epoxy resins and polyimide resins.
34. The friction material according to Claim 33 wherein the fibres have an average length of between approximately 12 mm and 120 mm.
35. The friction material according to Claim 33 that is by weight approximately 20% glass fibres, 10% ceramic fibres, 10% polyacrylonitrile fibres, and 60% water-based resin.
36. The friction material according to Claim 33 that is by weight approximately 30% cotton fibres, 10% ceramic fibres, and 60% water-based resin.



37. (Amended) The friction material according to Claim 33 [wherein the mat] further [includes] including

fillers selected from the group consisting of copper, rockwool, carbon, zirconium silicate, iron sulphide, alumina, rubber, diatoms, glass, aramid, acrylic and phenolic fibres.

38. The friction material according to Claim 37 that is by weight approximately 20% glass fibres, 10% ceramic fibres, 10% polyacrylonitrile fibres, 10% carbon, 10% coke, and 40% resol-based resin.

39. (Amended) The friction material according to Claim 37 that is by weight approximately 20% glass fibres, 10% ceramic fibres, 10% polyacrylonitrile fibres, 10% copper, 10% rockwool, and 40% resol-based resin.